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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,071	04/20/2001	Rajendra Kumar Bera	JP910000183US1	2724

7590 10/20/2004

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EXAMINER	
TANG, KUO LIANG J	

ART UNIT	PAPER NUMBER
2122	

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/839,071	BERA, RAJENDRA KUMAR	
	Examiner	Art Unit	
	Kuo-Liang J Tang	2122	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the amendment filed on 7/20/2004.

Claims 1-7 are pending and have been examined.

The priority date for this application is 4/20/2001.

Response to Arguments

2. Applicant's arguments, see REMARKS pages 8-10, filed 7/20/2004, with respect to Claims 1, 6-7 have been fully considered and are persuasive. The rejection of Claims 1, 6-7 has been withdrawn.

Claims 1-7 are now rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (hereinafter AAPA) in view of Horiguchi et al, US Patent No. 08/203,728 (hereinafter Horiguchi) further in view of Shaughnessy, US Patent No. 6,026,235, further in view of Sreedhar et al., US Patent No. 6,182,284 (hereinafter Sreedhar).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (hereinafter AAPA) in view of Horiguchi et al, US Patent No. 08/203,728 (hereinafter Horiguchi) further in view of Shaughnessy, US Patent No. 6,026,235, further in view of Sreedhar et al., US Patent No. 6,182,284 (hereinafter Sreedhar).

As Per Claim 1, AAPA teaches that a computer implemented method of determining, in a computer environment, the equivalence, if any, of two blocks of assignment statements (E.g. see RE page 2, lines 2, blocks B_1 and B_2) in a computer program (E.g. see RE page 1, lines 25-26, program) for use in compiler optimization of source code (E.g. see RE page 1, line 27), program verification, program proving, and like computing tasks, said method comprising the steps of

"(a) forming, for each block (E.g. see RE page 2, lines 2, blocks B_1 and B_2) of assignment statements (E.g. see RE page 2, line 3, "$^1S_1$, $^1S_2$, ..."), a corresponding array (E.g. see RE page 2, line 3, the examiner interprets {$^1S_1$, $^1S_2$, ... ^1S_M} is a single dimension array), each array comprising a plurality of elements corresponding to respective ones of the statements and populating the elements with attributes of the statements including the expression at the right-hand side of the statement (E.g. see RE page 2, lines 14-20 and 24-27)";

"(b) processing, in each array, each assignment statement in turn, the processing comprising the inspection of each unprocessed assignment statement in turn, in the order from the last unprocessed assignment statement to the first, to determine if the variable appearing on the left-hand side of the unprocessed assignment statement appears on the right-hand side of the assignment statement being processed (E.g. see RE page 2, lines

14-20 and 24-27)". AAPA does not explicitly discloses the processed order is from the last statement to the first. Horiguchi, however in an analogous art, discloses processed order is from the last statement to the first (E.g. see Horiguchi art col. 15:33-40, LIFO). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Horiguchi into the system of AAPA, to process in the order from the last statement to the first using stack frame. The modification would have been obvious because one of ordinary skill in the art would have been motivated to determine which LSH to be executed when specified conditions occur with the order list.

"(c) during step (b), in each array, if the variable appearing on the left-hand side of the unprocessed assignment statement also appears on the right-hand side of the assignment statement being processed, replacing all occurrences of such variable on the right-hand side of the assignment statement being processed, non-recursively, by the right-hand side of the said unprocessed assignment statement;" (E.g. see RE page 2, lines 29-30, "... the output variables $\{X_2, X_4, X_6\}$ will produce the same computed values", the examiner interprets that the step (c) is inherent otherwise, it will not produce the same results ($\{X_2, X_4, X_6\}$));

"(d) forming, from each array, a corresponding new block of assignment statements comprising the statements processed according to steps (b) and (c) less any statements which, after processing, is either an identity (the left and right sides of the statement are identical) or whose left-hand side variable is not one of the output variables" (Again, see as noted above of step (c), the new formed block is inherent so that the block is the corresponding output variables $\{X_2, X_4, X_6\}$);

"(e) creating, from each new block of assignment statements, a corresponding new array, each array comprising a plurality of elements corresponding to respective ones of the statements and populating the elements with attributes of the statements including the expression at the right-hand side of the statement;" (Again, see as noted above of step (d));

The combination of AAPA and Horiguchi do not disclose sorting, in each new array, the array elements in alphabetical order using the output variable name as the key. Shaughnessy, however in an analogous art, discloses in a manner such as "(f) sorting, in each new array, the array elements in alphabetical order using the output variable name as the key." (E.g. see Shaughnessy art FIG. 3 step 301 and associated text, e.g. col. 10:25-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Shaughnessy into the system of AAPA as modified by Horiguchi, to sort the array by name. The modification would have been obvious because one of ordinary skill in the art would have been motivated to allow fast binary searching by address or by name.

The combination of AAPA, Horiguchi and Shaughnessy do not disclose comparing the arrays to detect the equivalence of two blocks of assignment statements. Sreedhar, however in an analogous art, discloses in a manner such as "(g) comparing the arrays to detect the equivalence of two blocks of assignment statements." (E.g. see Sreedhar art, FIG. 21D, 24A, 25D and associated text, e.g. col. 38:25-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Sreedhar into the system of AAPA, Horiguchi and Shaughnessy, to detect the equivalence of two blocks of assignment statements. The

modification would have been obvious because one of ordinary skill in the art would have been motivated to validate the various intermediate-level codes during the optimization phases.

As Per claim 2, the rejection of claim 1 is incorporated and further the combination of AAPA, Horiguchi, Shaughnessy and Sreedhar does not explicitly disclose teaches "for each assignment statement in a block, testing the statement for compliance with predetermined rules concerning the applicability of steps (b) and (c), and, if said rules are not complied with, abandoning the method with an error message". Official notice is taken that this limitation is inherent in AAPA's system because when in order to generate the object code, the code must have been compiled. If the code is not compiled, the program is stopped (abandoning) and an error message will be generated as well by the compiler.

As Per claim 3, the rejection of claim 1 is incorporated and further AAPA teaches:

"whereby Step (a) is preceded by a formatting step of the right-hand side of each assignment statement according to predetermined rules." (Again, see as noted above of Claim 1, step (a)).

As Per claim 4, the rejection of claim 1 is incorporated and further AAPA teaches:

"whereby in Step (d) the right-hand side of each included assignment statement is formatted according to predetermined rules." (Again, see as noted above of Claim 1, step (d)).

As Per claim 5, the rejection of claim 1 is incorporated and further Beaumont teaches:

"whereby at the conclusion of Step (e) if the number of assignment statements is not equal to the number of output variables, abandoning the method with an error message." (Again, see as noted above of Claim 1, step (e)).

As Per Claim 6, is the apparatus claim corresponding to the method claim 1 and is rejected under the same reason set forth in connection of the rejection of claim 1.

As Per Claim 7, is the computer program product claim corresponding to the method claim 1 and is rejected under the same reason set forth in connection of the rejection of claim 1.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kuo-Liang J Tang whose telephone number is 703-305-4866. The examiner can normally be reached on 8:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Dam can be reached on 703-305-4552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

After October 25, 2004, examiner can be reached at new telephone number (571) 272-3705, and the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kuo-Liang J. Tang

Software Engineer Patent Examiner

Hoang-Anton Nguyen-Ba

ANTONY NGUYEN-BA
PRIMARY EXAMINER